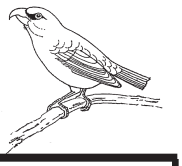
ENDEMIC BIRDS: RIDDLES & RESEARCH

Grades 4-7



OBJECTIVES	Students will use reading comprehension, writing, mapping and creative arts skills to: • Distinguish between endemic, indigenous, and alien birds. • Conduct research to determine which endangered and alien birds are found on each of the main Hawaiian Islands. • Create a map/mural depicting the location of endangered birds, in Hawai'i.
KEY CONCEPT	Endangered bird species differ from island to island and they are not as widely distributed as alien birds.
MATERIALS	student riddle sheet [provided], map of the Hawaiian Islands, large sheet of blue paper, green construction paper, and colored markers
VOCABULARY	endangered, endemic, indigenous, alien
SUBJECT AREAS	science, social studies, language arts, art
2005 HAWAI'I STATE CONTENT STANDARDS	
STANDARD	BENCHMARK
4.1.2	Differentiate between an observation and an inference (Sections 2 and 6)
4.2.1	Describe how the use of technology has influenced the economy, demography, and environment of Hawai'i. (Section 6 – during the discussion of conclusions the students have formulated by following the exercise in section 6, expand to discuss how technology, demography, and environment affect endemic bird numbers and extinction rate.)
4.3.2	Describe how an organism's behavior is determined by its environment- *e.g. courting, nesting, feeding patterns*. (Section 4 – Discuss how introduction of alien birds and habitat modification affects endemic bird behavior- Example: Newell's Shearwaters are attracted to the bright lights of civilization causing disorientation and fall-out- see Soaring Seabirds)
4.5.3	Describe how different organisms need specific environmental conditions to survive (Section 6)
5.1.2	Formulate and defend conclusions based on evidence (Section 5 – students can, when putting their islands up on the map, articulate conclusions based on evidence acquired through their library research on endemic birds. This helps meet all four rubrics for this standard.)
6.1.2	Explain how technology has an impact on society and science. (Section 5 – see suggested extension if desired)
7.1.3	Explain the need to revise conclusions and explanations based on new scientific evidence. (Sections 5 and 6)
7.3.2	Explain the interaction and dependence of organisms on one another. (Sections 4 – 6)
7.3.3	Explain how biotic and abiotic factors affect the carrying capacity and sustainability of an ecosystem (Sections 4-6: Example: The more alien species there are competing with endemic birds, the less food and habitat there is available for all species. This results in intense competition for resources. Native Hawaiian birds, which have often evolved into specialized niches in the absence of such competition, often fail to compete. Most alien bird species have faced competition, so they often succeed where natives fail.)

OVERVIEW: Students will review information from the previous activity by solving riddles describing the habitat and description of some of Hawai'i's endangered birds. Older students not exposed to the previous activity could work in groups to solve the riddles by conducting research and using fact sheets[1]. The information obtained from students' research, combined with that presented in the riddles, will be incorporated into a large map/mural of the islands depicting which endangered birds are found on each island. Students will also make lists of alien birds found on each island and compare their findings.

BACKGROUND: Hawai'i's endangered birds range from sea level to above the tree line in the sub alpine zone of Mauna Loa and Mauna Kea where the Hawaiian Petrel makes its nests. Our endangered forest birds usually have narrow ranges, which correspond to their requirements for native forest habitat. Most of the endangered birds now occupy a small fraction of their historic ranges. Changes to their habitat by the direct and indirect actions of people are largely responsible for the decline of so many of Hawai'i's native birds. The alien or introduced birds occupy a much wider range since the more widely available introduced plants provide them with suitable habitat.

PROCEDURE:

1) Challenge students to solve the riddles provided as a follow-up to the "creature feature" presentation. Either read the riddles to your students or distribute copies of them for students to solve individually.

2) As you review the information presented in the riddles, ask students to determine (***observe***) what all of the birds have in common. They are all endangered and endemic to Hawai'i. Distinguish between endemic, indigenous, and alien species.

3) Divide students into 5 groups to represent: (a) Hawai'i, (b) Maui, (c) Moloka'i and Lāna'i (d) O'ahu, and (&) Kaua'i.

4) Each "island group" should divide the following tasks:

- Conduct library research to determine which birds are endangered on their island[1] and discuss the reasons. Students should cite evidence from their research to support their conclusions.
- Make a list of alien or introduced birds found on the island.
- Draw a small picture (or trace one) of each of the endangered birds, label it with the bird's name and cut it out.
- Draw an outline of their island on construction paper and cut it out to be used in the creation of a map. (Have students make these roughly in proportion to one another.)

5) As each group presents their island's endangered birds, they could place their island on the map. It will become more of a mural as they staple or glue the endangered birds around each island. When a bird is found on more than one island, draw a line from the bird to the islands it inhabits.

6) Ask each group to list the alien birds found on their island. Then have groups compare their lists. Are the alien birds found on more than one island? Which of these birds have students observed outdoors? What conclusions can they draw (***infer***) about the distribution of endangered birds vs the distribution of introduced birds? Note that the endangered forest birds occupy narrow ranges that correspond to the location of our dwindling native forests and that waterbirds are dependent upon wetlands. The protection of these dwindling habitats is crucial to the survival of Hawai'i's endangered birds.

7) The mural could be placed in a central location in the school to arouse the interest and concern of

other students. It should be titled to attract attention to the fact that these birds occur nowhere else on Earth! As part of Hawai'i's rich and colorful natural heritage, these endangered birds will benefit from a sense of caring or stewardship on the part of all our citizens.

[1] Note references listed at back of this guide. Hawai'i's Birds, by the Hawai'i Audubon Society, is a concise reference for students to use. It includes color photos of the birds and indicates which are endangered with a red-circled E at the top of a page. The Atlas of Hawai'i, second edition, is also a good reference. On page 78 are maps of each island color-coded by vegetation type and a key to many of the birds found on each island. The most complete and up-to-date reference is the Hawai'i comprehensive Wildlife Conservation Strategy (CWCS), which includes fact sheets about each native bird. These can be accessed on the web at: www.dofaw.net (look for the link to CWCS and Species of Greatest Conservation Need.)

ENDEMIC BIRDS: RIDDLES

1) The webbing is reduced between my toes to help me walk on lava flows. My ancestors were more likely to swim, but it won't be water you'll find me in. I am the State bird of Hawai'i. Who am I?

2) My thick bill can make branches crunch and the larvae inside make a tasty lunch. My habitat is on the Valley Isle where koa forests were my home for awhile. But crops and cattle have taken their place, so 'ōhi'a forests are my only living space. Who am I?

3) My legs are long to assist me in wading. I dig in the mud with my long beak to catch my prey. Crustaceans and insects are among my favorite treats. I am easy to spot with my pretty pink legs and feet. Who am I?

4) My mainland cousins are nocturnal, but since I can be seen during the day that makes me diurnal. I like to eat mice and other small mammals. These were brought here by humans and I came here after. Who am I?

5) My long curved beak is great for sippin'. You will often see me fly from tree to tree, my beak a dippin'. 'Ōhi'a nectar is one of my favorites to drink as my other favorite has gone extinct. Who am I?

Answers: 1) Nēnē. 2) Maui Parrotbill. 3)Hawaiian Stilt 4) Pueo 5) I'iwi

EXTENSIONS:

Grade 4:

4.1.2 – Read the riddles and infer what birds have in common for section 2.

1) After working on section 6, have students complete research to compare the number of aliens vs the number of endangered endemic species.

2) Students should note characteristics of the islands including human influence on the islands, age of the island, etc. and model their observations and inferences after an example such as this: "On *student's island*, I observed # *of* native birds including species examples and # *of* non-natives including species examples. I also observed these characteristics: *examples of characteristics*. I can infer that…" (for example: a larger number of non-natives exist on O'ahu because it is the center for travel and it has the largest population of people and people bring birds, like parakeets, from other places.)

Grade 6:

6.1.2 - Use appropriate tools, equipment, and techniques safely to collect, display, and analyze data. Expand on this standard by having students expand on their research. Different island groups could use and share information sources so they can learn what is available. Library research rather then web-based would help them learn the value of books.

1) Using a display, have each island group share with the class why scientists believe their island's endangered species are extinct.

2) They should share their specific methods of data collection (web, encyclopedia, bird books, field guides, etc.), why they chose to display the data the way they did, and their steps in analyzing the information they obtained (why are only web-based sources not appropriate, etc).

3) Student groups could go even further by compiling data of alien birds found on their island and endangered birds on their island and make a graph or pie chart detailing bird numbers in percentages.

Grade 7:

7.1.3 – Explain the need to revise conclusions and explanations based on new scientific evidence. Sections 5 and 6.

1) Teachers: preface this activity by offering a bit of an introduction into the scientific process for students: Hypothesis, research, experimentation, and conclusion. Scientists continually have reasons to complete new research on a previously studied subject due to the constant state of change in the environment and technological applications.

2) Have students complete research on endemic and alien birds and their existence in the wild in the 1970's and how they changed from earlier dates. They should come up with a hypothesis as to why numbers are what they are in the 1970's.

3) They should then compare the endemic and alien bird numbers from the 1970's with the numbers from today and hypothesize why the numbers have changed. (note to teachers – alien bird species as well as the numbers of endangered and threatened endemic birds have dramatically increased in the past 35+ years.)

4) Students should evaluate and revise their conclusion from step two once they fully understand the research found in step 3.

Other Suggestions:

- Students could compose riddles about alien and endemic birds and challenge their classmates to solve them. These could be presented as a riddle-a-day and could serve to arouse interest in endangered and introduced birds.
- Have birds hanging from the rafters! Cutouts of endangered birds from each island could be suspended in the classroom as colorful mobiles.
- Older students could make more detailed maps, indicating the present range of some of the endangered birds on each island. They will need to contact the government agencies listed at the end of this guide to obtain more information.